

of Low Frequency Seismometer Calibrations

Tuesday 20 June 2023 10:13 (1 minute)

The traceable calibration of seismometers is research work within the European research project (*InfraAUV*), which is part of the EMPIR programme. In this project, novel in-laboratory and on-site calibration procedures for seismometers are developed. The in-laboratory calibrations are carried out using electrodynamic shakers to excite sinusoidal vibrations. These excitations are measured by the seismometer under test and a reference laser interferometer. The calibration process itself is already well-established, used with accelerometers and standardized in ISO 16063-11. However, several specialties of seismometers require consideration: 1) Frequency range and duration: the low frequencies (here, as low as 10 mHz) require a long measuring time. To reduce the time consuming and costly measurements, excitation methods with multiple frequencies have been developed and applied to seismometers; 2) Tilting: the high sensitivity of seismometers makes horizontal calibrations prone to deviations from tilt. The tilting results in components of the gravitational acceleration adding to the velocity signal generated by the exciter. If the tilting changes proportionally to excitation, it has the same frequency and phase as the excitation; 3) Electromagnetic disturbance: some seismometers are sensitive to magnetic fields. Electrodynamic shakers produce inhomogeneous static and dynamic magnetic fields. Both can negatively affect the measurement result.

E-mail

thomas.bruns@ptb.de

Promotional text

This contribution presents challenges of (very) low frequency seismometer calibrations, which are carried out to enable traceable on-site calibrations in seismic stations. It deals with the duration of the calibrations and disturbances due to tilting and electromagnetic fields.

Oral preference format

in-person

Primary authors: KLAUS, Leonard (Physikalisch-Technische Bundesanstalt (PTB)); Mr BRUNS, Thomas (Physikalisch-Technische Bundesanstalt (PTB))

Co-authors: CANU, Adrien (Laboratoire national de métrologie et d'essais (LNE)); Mr LARSONNIER, Franck (Commissariat à l'énergie atomique et aux énergies alternatives (CEA)); Mr WINTHER, Jacob Holm (Danish Primary Laboratory on Acoustics (DPLA))

Session Classification: Lightning talks: P1.2-1, P3.1, P3.4, P4.5

Track Classification: Theme 3. Monitoring and On-Site Inspection Technologies and Techniques: T3.1 Seismic, Hydroacoustic and Infrasound Technologies and Applications